

CLAIMS

What is claimed is:

1. A directory-enabled network element.

2. A directory-enabled network element as recited in Claim 1, comprising a directory enabling element installed in and executed by the network element, and configured to query, access, and update directory information that is managed by a directory service of a network that includes the network element.

3. A directory-enabled network element as recited in Claim 1, comprising:
a directory enabling element installed in and executed by the network element, and configured to query, access, and update directory information that is managed by a directory service of a network that includes the network element;
an application programming interface coupled to the directory enabling element and configured to receive directory services requests from application programs and provide the directory services requests to the directory enabling element.

4. A directory-enabled network element as recited in Claim 1, comprising:
a directory enabling element installed in and executed by the network element, and configured to query, access, and update directory information that is managed by a directory service of a network that includes the network element;
an application programming interface coupled to the directory enabling element and configured to receive directory services requests from application programs and provide the directory services requests to the directory enabling element;
a locator service coupled to the directory enabling element and accessible using the application programming interface and configured to locate servers that provide the directory services in the network.

1 5. A directory-enabled network element as recited in Claim 1, comprising:
 2 a directory enabling element installed in and executed by the network element, and
 3 configured to query, access, and update directory information that is managed
 4 by a directory service of a network that includes the network element;
 5 a bind service in the directory enabling element and coupled to a security protocol and
 6 configured to bind an external application program to the security protocol.

1 6. A directory-enabled network element as recited in Claim 2, further comprising a
 2 Unicode translation service configured to query, access, and update directory
 3 information that is encoded in a Unicode international character format.

1 7. A directory-enabled network element as recited in Claim 1, comprising:
 2 a directory enabling element installed in and executed by the network element, and
 3 configured to query, access, and update directory information that is managed
 4 by a directory service of a network that includes the network element;
 5 a locator service coupled to the directory enabling element and configured to locate
 6 servers that provide the directory services in the network;
 7 an event service coupled to the directory enabling element and configured to receive
 8 registration of an event and an associated responsive action from an
 9 application program, notify the application program when the event occurs,
 10 and execute the associated responsive action in response thereto.

1 8. A directory-enabled network element as recited in Claim 1, comprising:
 2 a directory enabling element installed in and executed by the network element, and
 3 configured to query, access, and update directory information that is managed
 4 by a directory service of a network that includes the network element;
 5 an application programming interface coupled to the directory enabling element and
 6 configured to receive directory services requests from application programs
 7 and provide the directory services requests to the directory enabling element;

8 a locator service coupled to the directory enabling element and accessible using the
 9 application programming interface and configured to locate servers that
 10 provide the directory services in the network;
 11 an event service coupled to the directory enabling element and accessible using the
 12 application programming interface and configured to receive registration of an
 13 event and an associated responsive action from an application program, notify
 14 the application program when the event occurs, and execute the associated
 15 responsive action in response thereto.

1 9. A directory-enabled network element as recited in Claim 1, comprising:
 2 a directory enabling element installed in and executed by the network element, and
 3 configured to query, access, and update directory information that is managed
 4 by a directory service of a network that includes the network element;
 5 a locator service coupled to the directory enabling element and configured to locate
 6 servers that provide the directory services in the network;
 7 a group policy interface coupled to the directory enabling element and configured to
 8 receive and update the directory service with one or more definitions of
 9 directory services policies that apply to groups of network devices in the
 10 network.

1 10. A directory-enabled network element as recited in Claim 1, comprising:
 2 a directory enabling element installed in and executed by the network element, and
 3 configured to query, access, and update directory information that is managed
 4 by a directory service of a network that includes the network element;
 5 a bind service in the directory enabling element and coupled to an security protocol
 6 and configured to bind an external application program to the security
 7 protocol;
 8 an event service coupled to the directory enabling element and accessible using the
 9 application programming interface and configured to receive registration of an
 10 event and an associated responsive action from an application program, notify

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11 the application program when the event occurs, and execute the associated
12 responsive action in response thereto.

1 11. A directory-enabled packet router for a packet-switched network.

1 12. A directory-enabled packet router as recited in Claim 11, comprising:
2 a directory enabling element installed in and executed by the router, and configured to
3 query, access, and update directory information that is managed by a directory
4 service of a network that includes the router;
5 a bind service in the directory enabling element and coupled to a security protocol and
6 configured to bind an application program to the security protocol;
7 an event service coupled to the directory enabling element and accessible using the
8 application programming interface and configured to receive registration of an
9 event and an associated responsive action from an application program, notify
10 the application program when the event occurs, and execute the associated
11 responsive action in response thereto.

1 13. A directory-enabled network data switch for a packet-switched network.

1 14. A directory-enabled network data switch as recited in Claim 13, comprising:
2 a directory enabling element installed in and executed by the switch, and configured
3 to query, access, and update directory information that is managed by a
4 directory service of a network that includes the switch;
5 a bind service in the directory enabling element and coupled to a security protocol and
6 configured to bind an application program to the security protocol;
7 an event service coupled to the directory enabling element and accessible using the
8 application programming interface and configured to receive registration of an
9 event and an associated responsive action from an application program, notify
10 the application program when the event occurs, and execute the associated
11 responsive action in response thereto.

- 1 15. A method of using a directory-enabled network element to query, access, or update
2 directory information of a directory service of a network that includes the directory-
3 enabled network element, wherein the directory-enabled network element comprises a
4 directory enabling element installed in and executed by the network element, and
5 configured to query, access, and update directory information that is managed by a
6 directory service of a network that includes the network element; the method
7 comprising the steps of:
8 binding the application program to the security protocol;
9 creating an event and an associated responsive action that are associated with the
10 application program;
11 in response to occurrence of the event, executing the responsive action, obtaining
12 policy information from the directory service, and converting the policy
13 information into one or more commands that are executable by the directory-
14 enabled network element.
- 1 16. A computer-readable medium carrying one or more sequences of instructions for
2 using a directory-enabled network element to query, access, or update directory
3 information of a directory service of a network that includes the directory-enabled
4 network element, wherein execution of the one or more sequences of instructions by
5 one or more processors causes the one or more processors to perform the steps of:
6 creating and storing a directory enabling element installed in and executed by the
7 network element, and configured to query, access, and update directory
8 information that is managed by a directory service of a network that includes
9 the network element;
10 binding the application program to the security protocol;
11 creating an event and an associated responsive action that are associated with the
12 application program;
13 in response to occurrence of the event, executing the responsive action, obtaining
14 policy information from the directory service, and converting the policy

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15 information into one or more commands that are executable by the directory-
16 enabled network element.

1 17. A computer-readable medium as recited in Claim 16, wherein execution of the one or
2 more sequences of instructions by one or more processors causes the one or more
3 processors to perform the further steps of:
4 locating a nearest directory server and binding the application program to the nearest
5 directory server that is located;
6 locating a nearest event server and binding the application program to the nearest
7 event server that is located.

1 18. A computer-readable medium as recited in Claim 16, wherein execution of the one or
2 more sequences of instructions by one or more processors causes the one or more
3 processors to perform the further steps of:
4 translating the policy information into one or more values that are ready to apply to a
5 router, whereby a virtual private network is created between the router and
6 another network device.

1 19. A computer-readable medium as recited in Claim 16, wherein execution of the one or
2 more sequences of instructions by one or more processors causes the one or more
3 processors to perform the further steps of
4 translating the policy information into one or more values that are ready to apply to a
5 set of internal data structures of a router, by calling one or more internal NOS
6 API functions, whereby a dynamic IPSEC configuration is created that
7 connects the router and at least one other network device.

1 20. A computer-readable medium as recited in Claim 16, wherein execution of the one or
2 more sequences of instructions by one or more processors causes the one or more
3 processors to perform the further steps of establishing an application programming
4 interface coupled to the directory enabling element and configured to receive directory

- 5 services requests from application programs and provide the directory services
- 6 requests to the one or more processors.

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